

ORIGINAL ARTICLE

Common Carotid Intima-media Thickness in Patients with Non-alcoholic Fatty Liver Disease: A Population-based Case-control Study

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Background/Aims: Metabolic syndrome is a well-known risk factor for atherosclerosis. Non-alcoholic fatty liver disease (NAFLD) has features of metabolic syndromes. This study aimed to investigate the association between NAFLD and atherosclerosis.

Methods: In a population-based study in southern Iran, asymptomatic adult inhabitants aged more than 20 years were selected through cluster random sampling, and were screened for the presence of fatty liver and common carotid intima-media thickness (CIMT), with abdominal and cervical ultrasonography, respectively. Those with fatty liver were compared to the same number of individuals without fatty liver.

Results: Two hundred and ninety individuals were found to have fatty change on abdominal ultrasonography, and were labeled NAFLD. Compared to normal individuals, NAFLD patients had significantly higher prevalence of increased CIMT (OR, 1.66; $p < 0.001$). Those with hypertension (HTN), diabetes mellitus (DM), higher waist circumference (WC) and older ages had significantly higher prevalence of thick CIMT. Through adjusting the effects of different variables, we indicated that NAFLD could be an independent risk factor for thick common carotid intima-media (OR, 1.90; 95% CI, 1.17-3.09; $p = 0.009$). It was also shown that age could be another independent risk factor for thick CIMT.

Conclusions: Individuals with risk factors such as HTN, DM, and high WC are prone to develop atherosclerosis of the carotid artery. The presence of NAFLD should be considered as another probable independent factor contributing to the development of carotid atherosclerosis. (Korean J Gastroenterol 2013;62:344-351)

Key Words: Thickness, intima-media; Artery, common carotid; Liver, fatty

INTRODUCTION

Nonalcoholic fatty liver disease (NAFLD) encompasses a spectrum of pathologic conditions, ranging from simple steatosis, to nonalcoholic steatohepatitis (NASH) and cirrhosis.¹ The disease is now the most common cause of elevated liver enzymes worldwide, including developing and developed

countries. Approximately 20-30% of adults in the general population of western countries have NAFLD,^{2,3} and its prevalence increases to 70-90% among individuals who are obese or have diabetes.⁴ Recent study from Iran (as a developing country) indicated the prevalence of 21.5%.⁵ Regardless of its hepatic sequel, there is an increasing trend of evidence suggesting that NAFLD is the missing part of metabolic syn-

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drome (i.e. a sixth criterion). From this point of view, NAFLD strongly relates with diabetes mellitus, hypertension, and obesity,⁶ and consequently, with increased risk for cardiovascular events. The atherogenic effect of metabolic syndrome was previously established, as well as its components; but the role of NAFLD in this regard is still being debated. There are evidences of increased rate of cardiovascular mortality in patients with NAFLD and/or cirrhosis, but the role of NAFLD as the main etiology, or as just a co-morbid disease has remained unclear.^{7,8} Many published studies focusing on this issue were done in symptomatic patients with NAFLD, or on patients in clinical follow up. Few studies, if any, evaluated this relation in a population-based setting, with the participation of asymptomatic individuals.

Intima-media thickness (IMT) of the common carotid artery is a reliable predictor of atherosclerosis. Increased common carotid intima-media thickness (CIMT) has been considered as a marker of atherosclerosis and cardiovascular disease. This study was conducted to find the relation of NAFLD and atherosclerosis as the main predictor of future cardiovascular disease, in a population-based setting, through comparison of the IMT of carotid artery and other important cardiovascular risk factors, between patients with NAFLD and controls.

SUBJECTS AND METHODS

1. Study population

This study was an extension of our previous study on the prevalence of fatty liver disease in the general population in Shiraz, southern Iran, which has recently been published.⁵ Based on ultrasonographic finding, as described in the following parts, individuals with fatty liver disease were identified.

Flow chart of the study is demonstrated in Fig. 1. Among 819 individuals who agreed to participate in the study, 342 had evidence of fatty liver disease on ultrasonography in any form, from mild to severe (ultrasonographic criteria are described in the "study protocol" part).

We excluded patients with positive or suspicious results for HBsAg, anti-HCV and HIV. We also excluded subjects who had any history of liver disease, had suspicious hepatic-related signs and symptoms during the physical exam or after history taking, had a history of pregnancy in the previous year, had a history of weight loss or weight gain in recent years, or who had had any kind of major organ failure. Exclusion of individuals reporting alcohol consumption was ensured, by interviewing the participants at two different times. We excluded pregnant women, or those who had delivered within the past six months. Due to different genetic and environmental background, which could have affected our results, non-Iranian residents were also excluded.

Fifty-two of these individuals were excluded, based on the

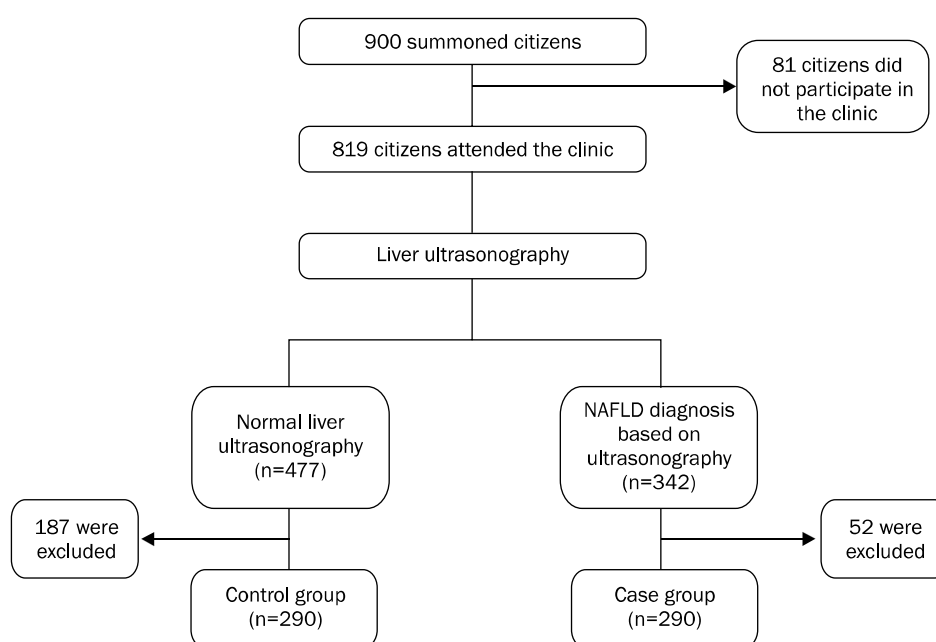


Fig. 1. A flow chart of the study.